Learning Theories Summary

Theory and Author	Description	Relevance to Teaching Mathematics
Social Learning Theory (Bandura)	Bandura's social learning theory encompasses attention, memory, and motivation, and focuses on the fact that people learn from one another through the behaviours and attitudes of others. In essence, the theory focuses on the fact that learning occurs observationally through modelling. In order for said modelling to be effective, four necessary conditions must be met: 1. Attention (Students must be paying attention to the behaviour being modelled for them if they are to learn it) 2. Retention (Remembering the modelled behaviour that the student paid attention to) 3. Reproduction (Demonstrating the fact that the behaviour has been learned by demonstrating the skill or behaviour that was modelled) 4. Motivation (Students must have a reason to imitate what is being modelled for them) In addition, Bandura subscribed to the notion of "reciprocal determinism". This concept states that one's behaviour and environment are dependent on one another.	When I think of Bandura's social learning theory, the relationship between student and teacher comes to mind. Teachers model behaviours and skills that students learn, and their modelling should fulfil the four conditions outlined by Bandura in order to be effective. In order for retention to occur, students must be attentive. Retention in mathematics is extremely important. As a mathematics teacher, I try and avoid providing students with a "quick-fix" for problems (a way to solve problem types that students can simply memorize) however there are many skills that students need to memorize. For instance, it is necessary for students to understand how to collect like terms, and retain this method. Motivation is essential to the teaching of mathematics. Teachers must find ways to make their modelled behaviours intriguing to students, and keep them motivated. The last point made (about reciprocal determinism) is interesting because it addressed the classroom environment. A math classroom experiences a positive atmosphere when the people in it demonstrate a positive attitude. It is therefore essential that teachers incorporate this positivity into their lessons, and encourage students to have similar outlooks.

ARCS Model of Motivational Design (Keller)	ARCS stands for attention, relevance, confidence and satisfaction: Attention • Can be gained by two means: perceptual arousal (which uses surprise to gain student interest) or inquiry arousal (which stimulates student curiosity in order to intrigue them) Relevance • Establishing context for students and making the lesson relevant to their life allows learner motivation to increase. Teachers should strive to make material relevant for students by using familiar language and relatable examples. Confidence • Keeping student motivation up can be done by communicating a belief in success to one's students. In addition, giving students a goal to strive for and helping them attain said goal by providing feedback is a great way to build up confidence. It is only when confidence is high that students will truly experience success. Satisfaction • In order for learning to occur, it must be satisfying for students. Whether this satisfaction comes from grades, positive feedback, or other incentives, it is essential for the promotion of good learning.	Mathematics can be an extremely abstract concept for students. Although it is a science and its concepts are therefore based in fact, students often have trouble wrapping their mind around problems, and therefore loose attention because they feel defeated. Keeping lessons and problems relevant works to keep student attention up because it allows students to better understand material. Taking this theory into consideration when authoring math problems is beneficial. Math teachers should keep material relevant by using examples that are relatable to student life (for instance, one may design a parabola word problem about a student throwing a football). In addition, relevance should be encouraged by the use of appropriate numbers. One should not assign a question whose numbers are too big or too small, so as to not confuse students. Finally, confidence and satisfaction should be encouraged in students so that they remain engaged. Many students believe that math is too difficult of a subject. I believe that this is a huge problem in mathematics. Providing students with an opportunity to experience academic satisfaction allows for their confidence to increase. It is a teacher's job to provide students with said opportunities, and to provide them with useful feedback that allows them to be successful.

Situated Learning Theory (Lave)	This theory rests on the belief that learning is situational, rather than abstract. This means that learning occurs through activity, rather than by learning about abstract and intangible models. It also states that learning is rooted in context and culture, and is usually not deliberate. Social interaction is essential to the theory of situated learning. In order for learning to occur, students must be members of a community of practice. Once they are members, they move from beginner to novice, to expert. This learning community is enhanced by strong relationships, so student interaction and relationship is an essential part of this theory. Students in a learning community experience learning outside of the classroom. It is for this reason that this theory appealed to me. I believe that effective students learn both inside and outside of the classroom, and I really like that this theory allows room for this to occur.	In interpreting Lave's situated learning theory and applying it to the mathematics classroom, I see two prominent points. Firstly, math is taught most effectively when students are provided with both context and tangible models. Such models can include physical tools that we used in the fall semester (pattern blocks for example), as well as electronic ones (such as Gizmos). Doing so will allow for students to have a tangible model with which they can better understand concepts. The second point that I took from this theory is that of a community atmosphere. Situated learning theory postulates that students become more knowledgeable on a subject only once they have entered a learning community. It is therefore the responsibility of the teacher to provide students with such a community. This can be achieved by the teacher when he or she works to build inclusion. Building a sense of community and togetherness is essential to the atmosphere of a classroom. Not only does this provide students with an atmosphere that allows them to learn from one another, but also allows students to feel comfortable to participate, be engaged, and truly learn.
Discovery Learning (Bruner)	Discovery learning allows for students to tackle a novel problem using existing knowledge and collaborative work. The theory challenges students to interact with the problem (possibly by the use of physical or electronic models) in order to better understand them. I liked this theory because it encourages student retention of	Discovery learning is a great way for math teachers to bring about a reform in the teaching of mathematics. I found this theory related to the flipped classroom. In the flipped classroom model of a learning environment, students have direct access to the new information and are encouraged to work collaboratively to solve the

	knowledge. If students work through issues that the new knowledge prompts, they are likely to better remember subject matter because they have developed a personal connection with it. In addition to allowing students to retain knowledge, discovery learning also promotes engagement, motivation, independence, and the development of problem solving skills.	problem. Rather than having access to new knowledge, discovery learning exposes students to a new challenge problem that they are encouraged to work through with the help of their peers. This has many benefits to the math student, one of which can be seen when considering student attitudes towards word problems. Traditionally, students have hated word problems! They see them as too challenging and often give up on them. I believe that this problem is rooted in the fact that math students lack real problem solving skills. Discovery learning allows students to build these skills and become better at more difficult math problems (such as word problems).